(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
15 September 2011 (15.09.2011)

PCT

(10) International Publication Number
WO 2011/112900 A2

(51) International Patent Classification:
A61K 9/127 (2006.01) *A61K 31/122* (2006.01)
A61K 9/107 (2006.01) *A61P 35/00* (2006.01)
A61K 47/30 (2006.01)

(21) International Application Number:
PCT/US2011/028042

(22) International Filing Date:
11 March 2011 (11.03.2011)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
61/313,632 12 March 2010 (12.03.2010) US
61/385,107 21 September 2010 (21.09.2010) US

(71) Applicant *(for all designated States except US)*: **CYTOTECH LABS, LLC** [US/US]; 1845 Elm Hill Pike, Nashville, Tennessee 37210 (US).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **NARAIN, Niven, Rajin** [GY/US]; 350 Third Street, Suite 2005, Cambridge, MA 02142 (US). **MCCOOK, John, Patrick** [US/US]; 4913 Southern Hills Drive, Frisco, TX 75034 (US).

(74) Agents: **HANLEY, Elizabeth, A.** et al.; McCarter & English, LLP, 265 Franklin Street, Boston, Massachusetts 02110 (US).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

[Continued on next page]

(54) Title: INTRAVENOUS FORMULATIONS OF COENZYME Q10 (COQ10) AND METHODS OF USE THEREOF

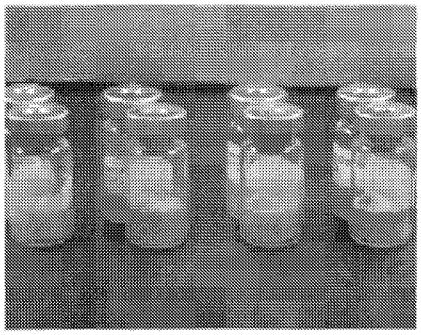


Fig. 1 lyophilization of forms R, A, O and C in order as depicted from left to right.

(57) Abstract: Disclosed herein are formulations suitable for parenteral administration of certain hydrophobic active agents such as Coenzyme Q10. Methods of preparing the same and methods of treatment of oncological disorders using the same are also provided herein. The formulations comprise an aqueous solution; a hydrophobic active agent dispersed to form a colloidal nano-dispersion of particles; and at least one of a dispersion stabilizing agent and an opsonization reducer wherein the colloidal nano-dispersion of the active agent is dispersed into nano-dispersion particles having a mean size of less than 200-nm. Methods of preparing the parenteral formulations comprise dispersing the hydrophobic active agent by high pressure homogenization by (1) adding hydrophobic active agent to a 65°C bath of water and mixing to form a hydrophobic active agent/water mixture; (2) adding a dispersion stabilizing agent to the hydrophobic active agent/water mixture and mix at 65°C to form a hydrophobic active agent/water/stabilizer mixture; (3) adding an opsonization reducer to form a hydrophobic active agent/water/stabilizer/reducer mixture; (4) pre-heating a Microfluidizer to 65°C; and (5) processing by mixing the hydrophobic active agent/water/stabilizer/reducer mixture in the Microfluidizer at 65°C such that a hydrophobic active agent colloidal nano-dispersion having a mean particle size less than 200-nm is formed. Provided herein are also methods of treating oncological disorders by administering formulations described herein to a subject such that treatment or prevention of the oncological disorder occurs.

WO 2011/112900 A2

— *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

Published:

— *without international search report and to be republished upon receipt of that report (Rule 48.2(g))*